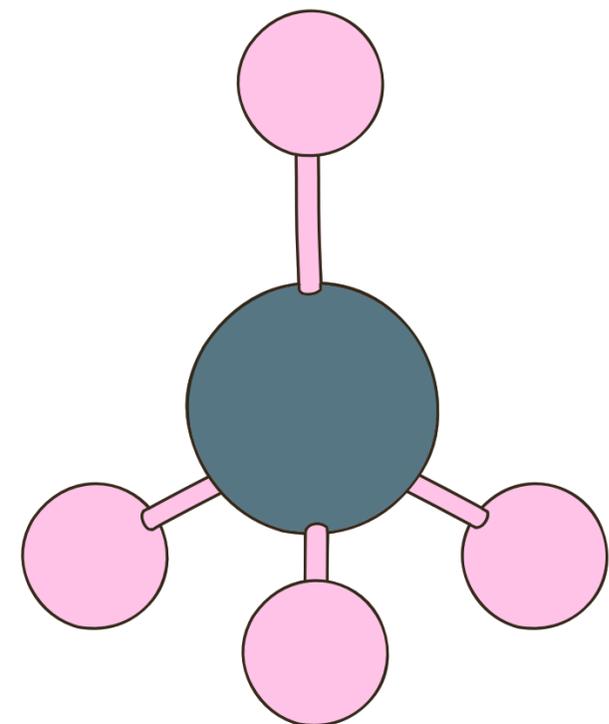


# Clinical significance of enzyme assays second stage

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Medical Biochemistry



# BLOOD PLASMA ENZYME LEVELS IN DISEASE STATES :

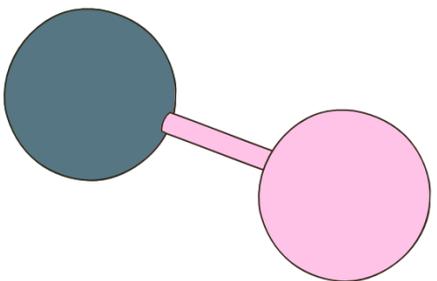
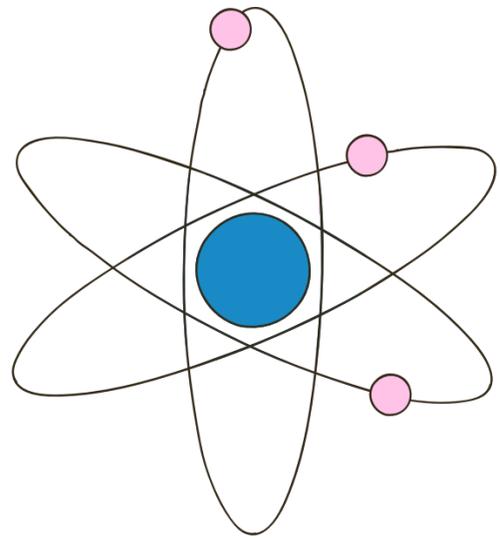
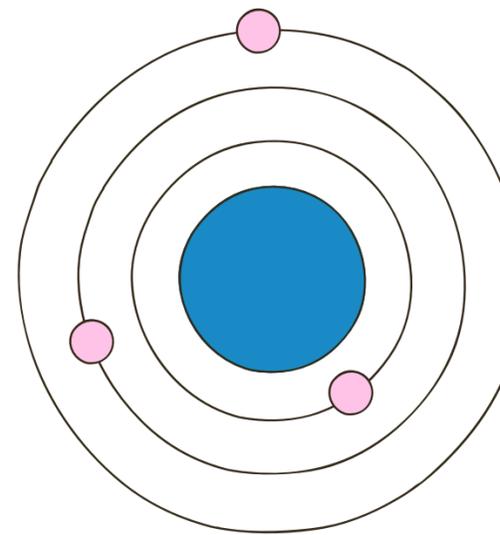
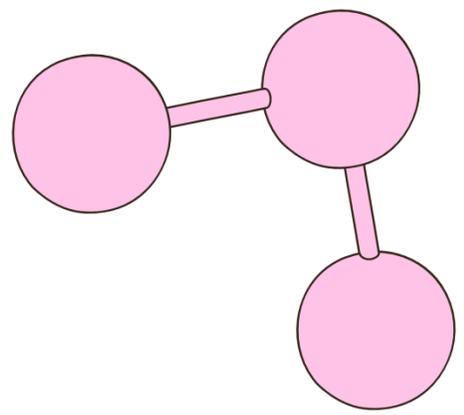
while most enzymes operate intracellularly, some are secreted into

blood plasma, including zymogens from the liver that participate in

coagulation. enzymes released from cells during normal turnover typically

remain intracellular, and elevated plasma levels of these enzymes can

signal exceeding normal cellular turnover.



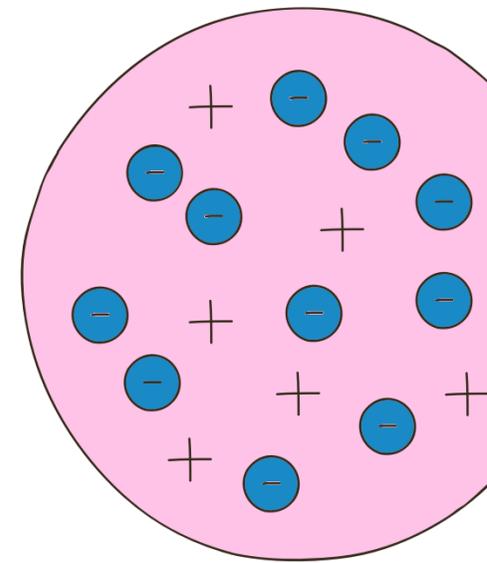
blood plasma enzyme levels in disease states:

tissue damage from diseases often leads to cell lysis, releasing

intracellular enzymes into the bloodstream, where their elevated

levels are routinely measured for diagnostic purposes. the concentration of these enzymes

correlates with the extent of tissue injury, aiding in the assessment of damage, therapeutic response, and patient prognosis.



# PLASMA ENZYMES AS DIAGNOSTIC TOOLS :

plasma enzymes as diagnostic tools:  
certain enzymes exhibit high activity in

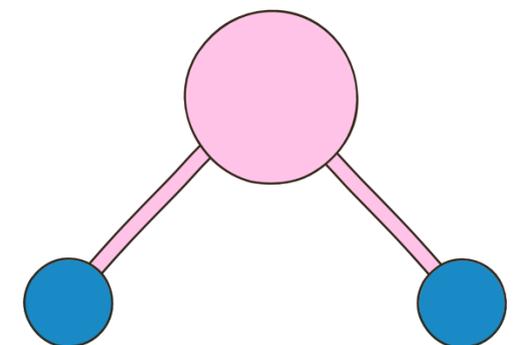
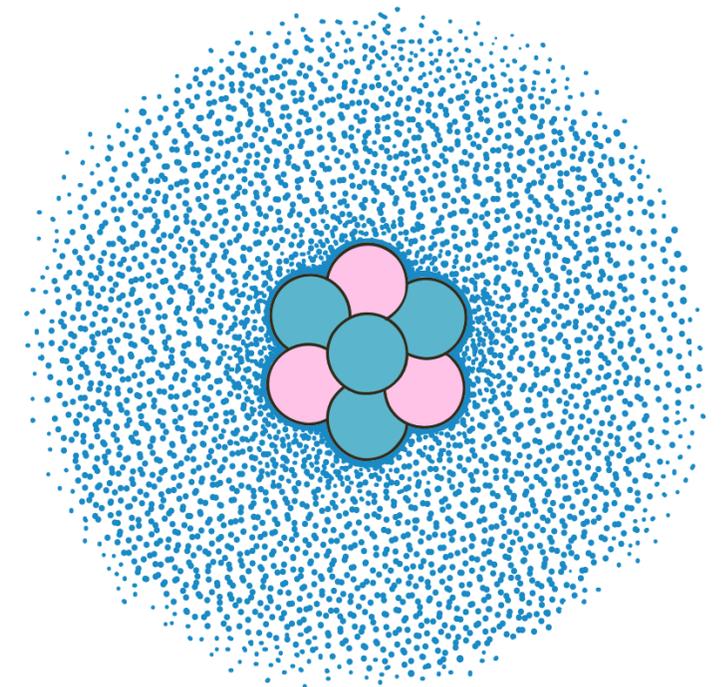
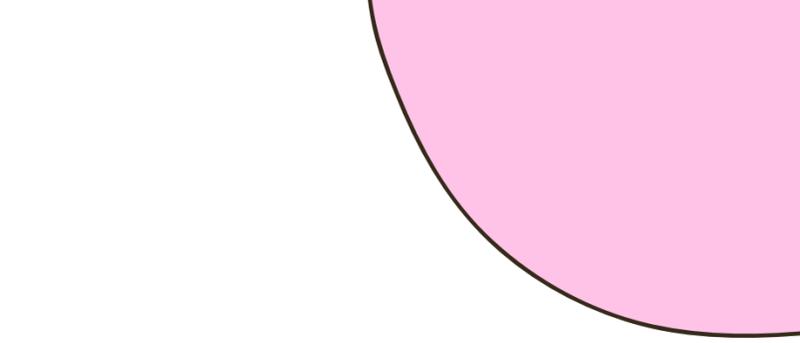
specific tissues, making their elevated levels in blood  
plasma indicative of tissue damage. for

instance, alanine aminotransferase (ALT) is predominantly  
found in the liver, and its increased

presence in plasma suggests hepatic injury, which is  
assessed in liver function tests. conversely

enzymes with broader tissue distribution offer less specific  
insights into the location of cellular

damage, limiting their diagnostic utility.



## ISOENZYMES :

are variant forms of an enzyme that catalyze the same reaction but differ in their amino acid

sequences, leading to distinct physical properties. for example, lactate dehydrogenase

(LDH) has five isoforms (LDH1-5), with specific distributions in tissues such as LDH5 in liver

and skeletal muscle, LDH2 in red blood cells, and LDH1 in myocardial tissue. the unique

patterns of isoenzymes in blood plasma can help identify the site of tissue damage, as their

levels fluctuate under various disease conditions.

isoenzyme quaternary structure:

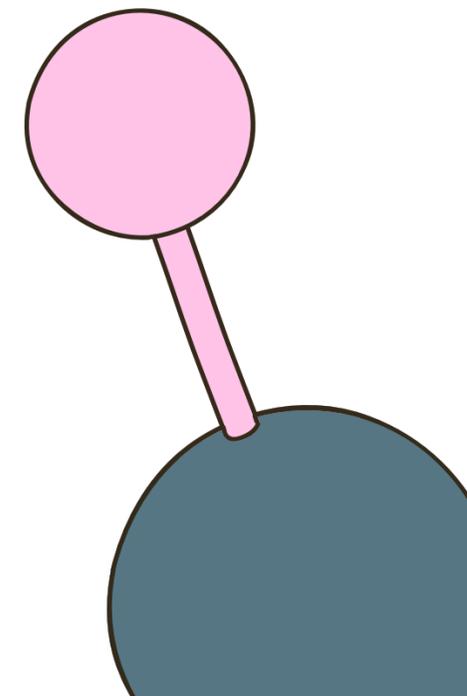
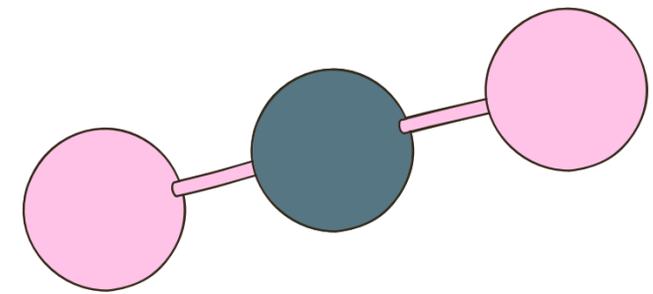
isoenzymes, such as lactate dehydrogenase (LDH) and creatine kinase (CK), comprise

different subunit combinations. LDH has five tetrameric forms (LDH1 to LDH5), varying

from HHHH to MMMM, while CK consists of three dimeric isoenzymes (CK1, CK2, CK3)

formed from B and M subunits. each isoenzyme exhibits distinct electrophoretic mobilities, with CK1 predominantly

found in the brain and CK3 in skeletal muscle, while CK MB is specific to cardiac tissue.



historical use in diagnosis of myocardial infarction:

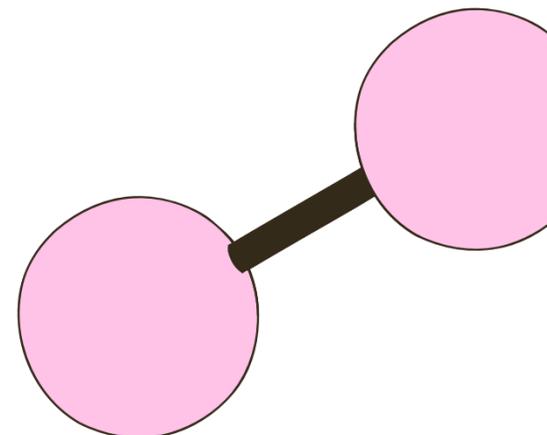
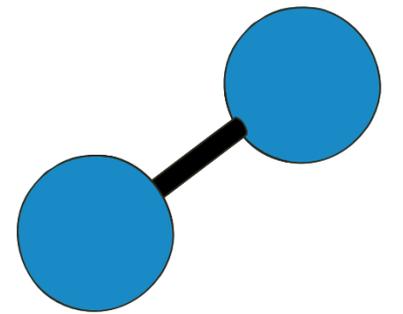
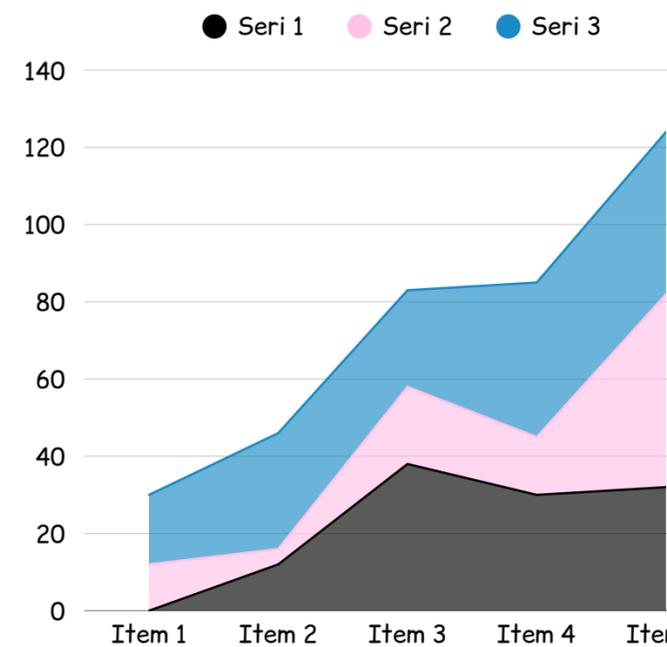
the measurement of cardiac-specific isoenzymes, particularly CK MB, was crucial for

diagnosing myocardial infarction (MI) before the introduction of troponin tests. CK MB is

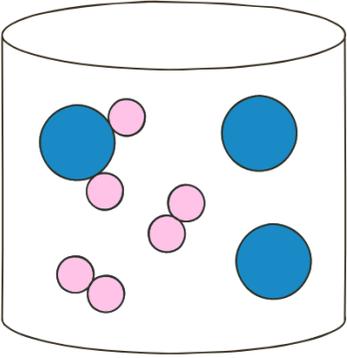
predominantly found in myocardial tissue, and its presence in blood plasma indicates heart

muscle damage, typically appearing 4 to 8 hours after chest pain onset, peaking around 24

hours, and returning to baseline within 48 to 72 hours.



# CLINICAL APPLICATION: DIAGNOSTIC USE OF TROPONINS



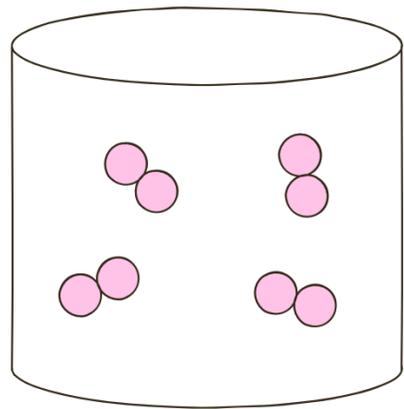
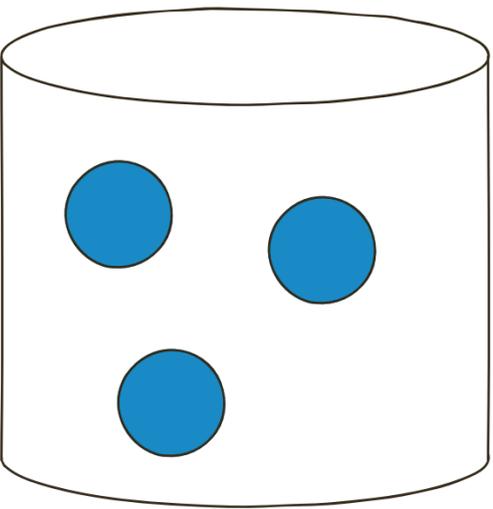
troponins T (TnT) and I (TnI) are regulatory proteins released into plasma following

cardiac damage, serving as highly sensitive and specific markers for

myocardial infarction (MI). they appear within 4 to 6 hours, peak at 24 to 36

hours, and remain elevated for 3 to 10 days, making them the "gold standard" for

MI diagnosis, especially in conjunction with clinical symptoms and ECG changes.



**Thank You  
for your  
attention!**

